PROCEEDINGS

OF THE

EDINBURGH PHYSIOLOGICAL SOCIETY.

SUMMER SESSION—1851.

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PHYSIOLOGICAL SOCIETY OF EDINBURGH.

SUMMER SESSION—1851.

A MEETING of several gentlemen, interested in the progress of physiological science, was held on the 4th of June 1851, when it was resolved that a society should be instituted, having for its object the investigation of the structure and functions of all organised beings in their healthy and diseased conditions. The following gentlemen were appointed office-bearers:—*President*, Professor Bennett; *Vice-Presidents*, Mr Zaglas and Mr John Scott Sanderson; *Secretaries*, Dr W. T. Gairdner and Mr John Barlow.

MEETING I.—*June* 7, 1851.—Professor BENNETT, President, in the Chair.

INTRODUCTORY ADDRESS BY THE PRESIDENT.

In the infancy of natural science, its cultivators were few in number, and each could without difficulty comprehend all that was known regarding it. As facts multiplied, the principle of division of labour came into play; with this disadvantage, however, that circumscribed research led to circumscribed generalisation, and we had as many sciences as there were divisions in natural history. From this state of things we are now emerging; for within the last twelve years it has been demonstrated that the laws regulating the various parts of the organic world, if not identical, are closely allied, and dependent on each other. It has resulted, that out of the numerous divisions into which natural science has been split, and out of the multitudinous details which have been discovered, a system of unity and simplicity is now evolved, capable once again of being embraced by a single mind. For, instead of there being a science of Botany, a science of Zoology, a science of Physiology, and a science of Pathology, there is in truth but one science, the laws of which embrace the facts of all these. Thus the growth of a plant and of an animal is brought about by like histological changes; physiological and pathological products are fundamentally the same; the chemical composition and structural elements of the two realms of organic nature are closely allied, and the dependence of one on the other has been exactly determined; the mode of reproduction, and the homologies observable throughout the vegetable and animal kingdoms, exhibit in their types remarkable points of unity; and in the functions performed by all, we begin clearly to perceive the same physical, the same chemical, and the same vital phenomena. In short, the present aspect of physiology points out to us that all the natural sciences must

be intimately connected in order to form a consistent whole,—not like a chain, the component parts of which are united by a superior and an inferior link in the series, but rather like a piece of woven cloth, every thread of which is brought into necessary connection, and is intertwined with its fellows.

Such, gentlemen, is the idea which has led to the formation of this Society; and there is every reason to suppose that, if we can bring together the anatomist, the botanist, the physiologist, the pathologist, and the chemist, science will receive a more powerful impulse from their united than from their individual exertions. The time and place are favourable for making the attempt; for at no period in the history of this school has a larger number of original investigators existed among its youthful members. The field for observation in this city is most abundant; and it has long been felt that numerous important facts have been lost, and several laborious researches rendered unproductive, from the want of a society of easy access, and of aim sufficiently comprehensive to take cognizance of them. Here, then, we propose to assemble such of the students as distinguish themselves in investigation, the teachers of the Medical School, and the professors of the Faculty, to occupy ourselves with the confirmation of demonstrative facts, and a rigid criticism of the theories derived from them.

The constitution of our Society is of the most simple description. It is unattended with expense. All who are actual labourers in the field of science may readily qualify themselves for admission by forwarding to us an original observation, which henceforth shall be the only recommendation demanded. In this way we hope to be enabled to carry out our object, united by mutual esteem and respect. That object is the investigation, by every possible means, of the structure and functions of organised beings,—in one word, the advancement of physiology, in its widest sense. The results of our meetings will be published, under the conviction that, so long as the Society adheres to the letter and spirit of its constitution, its labours must contribute to the sum of human knowledge.

I now invite all who can, and are willing to co-operate with us, to join our young institution, satisfied, from the position and known talents of the gentlemen I have the honour to address, that as its object is worthy of their exertions, so it will be prosecuted with uninterrupted diligence and untiring zeal.

COMMUNICATIONS.

ON A PECULIAR ORGANISED STRUCTURE IN A FIBROUS TUMOUR.

1. *Dr Bennett* exhibited the half of a fibrous tumour, which, when entire, was somewhat larger than a billiard-ball. It was found loose in the cavity of the peritoneum by the late Dr John Reid, who has described it in a paper inserted in the "Edinburgh Medical and Surgical Journal," No. 128. He observes, "With the exception of a few depressions, it was perfectly round and smooth. On making a section of the tumour, it was found to consist of a number of concentric laminæ, with a calcareous deposit in the centre. It was very elastic; and the fresh section was exactly similar to the fibro-cartilage placed between the bodies of the vertebræ,—with this difference, that the centre of the intervertebral substance is soft and pulpy, while the centre of the tumour was occupied by the calcareous deposit."

On making a thin section of the so-called calcareous deposit, it was ascertained by Dr Bennett to present a remarkable organic structure. This was exhibited to the Society under the microscope, and presented a cellular structure, closely analogous to what was observable in the pith of phanerogamous plants. The cells varied in size, from the one-thousandth to the one-five-hundredth of an inch in diameter, round in the centre, more compressed at the edges, and presenting a broad rim, which was loaded with mineral matter. Here and there dense partitions, resembling in structure compressed woody fibre, passed through the mass of cells. It was clear, from this description, that the hard nucleus of the tumour was not composed of a plum or apricot stone, to which at first it bore a consider-

able resemblance. Could it be the branch of a tree, which had been swallowed, ulcerated through the intestines, and formed the nucleus of the tumour, which, at first united, had afterwards become detached from the peritoneum? Mr Quekett, to whom Dr Bennett had shown the preparation, considered the texture to be cartilaginous; but he was by no means satisfied of the correctness of this opinion.

STRUCTURE OF INTESTINAL MUCOUS MEMBRANE.

2. *Dr Van der Byl* shewed specimens of intestine, prepared after the manner of Professor Brücke of Vienna, so as to show the muscular structures within the mucous coat. The preparations were made by boiling in acetic acid, and making thin sections of the dried intestine. (See "Monthly Journal of Medical Science," for April.)

AMMONIACAL AND EARTHY URINARY DEPOSIT.

3. *Dr W. T. Gairdner* exhibited a specimen of a deposit in urine, corresponding in characters with those described by Dr Golding Bird as urate of soda, and by others as urate of ammonia. It consisted of spherical bodies up to about $\frac{1}{50}$th of a line in diameter, coated with projecting spicula, or rather curved blunt processes resembling stalactites, of considerable size and firmness, and of rather deep amber colour. It was probably a combination of ammoniacal and earthy urates, as it proved, on analysis, to have no fixed alkaline bases, but to contain lime and magnesia in appreciable quantity.

CLINICAL MICROSCOPE.

4. *Dr W. T. Gairdner* showed a very convenient and generally-useful microscope which he had recently had constructed by Mr James Bryson, and had already employed sufficiently to be convinced of its great superiority, for most purposes of the practitioner, to all the portable and pocket-instruments now in use. It consists of a simple but very carefully-ground Coddington lens of small size, and magnifying about 180 diameters, set in a convenient handle and adjusted to a shallow cylinder of silver, which at one end embraces and surrounds the setting of the lens, and at the other bears a small plate of glass for the object, which may, if necessary, be covered by another glass. The instrument is raised to the eye opposite a moderately strong light, and the object is focalised by a screw fixed in the handle, and bearing on the spring by which the silver cylinder is kept close to the lens. The instrument can be managed conveniently with one hand; and as it is considerably shorter, and not much thicker, than an ordinary pencil-case, it may easily be adapted, if requisite, for the pocket. It distinguishes readily all the ordinary urinary deposits, and to a practised eye, suffices in ordinary cases for the examination of blood, pus, and most of the elements of the tissues; although for delicate observations, a higher power is of course requisite. Perhaps the greatest recommendation of this instrument is the ease and comfort with which it can be used; the examination of a fluid being at once effected by dipping the glazed end of the silver cylinder into it, or placing a drop on the outer surface of the glass; then on shaking off the superfluous moisture and raising the instrument to the eye (at the same time using the focal adjustment), the fluid is seen to float down the glass, bearing constantly renewed objects over the field of the lens, and enabling a rapid and effective survey of the contents of the fluid to be made in much less time than it could be done by a compound microscope with a large field, even if ready on the spot for action.

CALCAREOUS STRUCTURE FROM PREGNANT UTERUS.

5. *Mr Barlow* showed a hollow spherical body, consisting of a shell of calcareous matter, imbedded in a fibrous tissue, and about the size of an ostrich egg, which was expelled from the uterus of a mare, along with the after-birth. It

contained another smaller sphere, of calcareous matter with projecting spicula, about the size of a hazel-nut. Some discussion took place as to whether it could be considered a blighted ovum; but it was generally agreed that no distinct opinion could be formed of its nature.

Mr Drummond was appointed to report on the structure and chemical composition of the calcareous or bony matter of the mass.

CONCRETION IN FALLOPIAN TUBES.

6. *Mr Cobbold* showed a drawing representing ossification within the Fallopian tubes, occurring in a married woman who had never born children, and in whom were found (post-mortem) extensive adhesions throughout the entire abdominal cavity. From the rarity of the position, it afforded an interesting example of the conversion of lymph into osseous matter. The individual died of an affection of the lungs.

Dr W. T. Gairdner thought the appearances in this case corresponded with those to be expected in old tubercular disease of the uterine organs and peritoneum. It was unfortunate that no note had been preserved of the kind of disease of the lung.

MECHANISM OF THE PELVIS.

7. *Mr Zaglas* made a long verbal communication on the mechanical relations of the spine and sacrum to the pelvis, which will be noticed in a future report.

Dr W. T. Gairdner and *Mr Barlow* were appointed to report on Mr Zaglas's views.

MEETING II.—*June* 14, 1851.—Professor BENNETT, President, in the Chair.

REPORTS.

ANALYSIS OF UTERINE CALCAREOUS STRUCTURE.

1. *Mr Drummond* communicated the following report on the structure presented by Mr Barlow at last meeting:—

When analysed qualitatively, the tumour showed by Mr Barlow was found to contain carbonate of lime, phosphate of lime, a small quantity of phosphate of magnesia, and some soluble saline matter, chiefly chloride of sodium. I also tested it for fluorine, but could not detect any; which, however, may have been owing to the small quantity of the substance on which I was obliged to operate. I found in it a small quantity of sulphate of lime; but this, in all probability, did not exist as such in the structure originally, but was produced, during incineration, by the oxidation of the sulphur contained in the organic matter.

A quantitative analysis showed these substances to exist in the following proportions in 100 grains of the substance, dried at 212° till it ceased to lose weight:—

Organic matter, ...	42·08
Carbonate of lime, ...	11·73
Phosphates of lime and magnesia, . .	45·30
Soluble saline matter, ...	·89
	100·00

Comparing this with the analysis of ordinary bone, we find that it differs from it only in containing a somewhat larger amount of organic matter and carbonate of lime, and a smaller amount of phosphates.

With respect to minute structure, a thin section presents almost the same appearance as ordinary bone, exhibiting haversian canals, lacunæ, and canaliculi,

just as ordinary bone does; the only difference being, that the haversian canals are somewhat larger, and their lacunæ less regularly arranged, than in normal bone. It is somewhat curious that, if the lacunæ in bone arise from the nuclei of cartilage cells, we should here find regular lacunæ existing where it is probable there were no cartilage cells,—the organic tissue, when freed of its calcareous matter, presenting the appearance merely of a fibrous membrane.

COMMUNICATIONS.

PARASITIC CONFERVA.

1. *Dr Bennett* showed specimens of a fungus, or parasitic conferva, which he had found upon the dead larvæ of the common garden butterfly, which presented an umbelliferous, instead of the usual dichotomous, division of its thalli, and terminating in numerous mycelia, containing sporules.

TUBERCLE OF EPIDIDYMIS.

2. *Mr Barlow* exhibited a specimen of tubercular disease affecting the epididymis of a boar. The testicle was enlarged, but not altered in structure.

LEUCOCYTHEMIA.

3. *Dr W. T. Gairdner* showed the spleen, lymphatic glands, and blood, of a man, aged about sixty, who had died in the Infirmary, in a highly adynamic state, with traces of purpura and obscure fever. He had no distinct local affection, except ulceration of the gums, probably caused by mercury before his admission, and the remains of what appeared to have been two chancres on the corona glandis, with a muco-purulent discharge from the urethra. The spleen was much enlarged, and in parts softened; the lymphatic and mesenteric glands also enlarged; and the blood presented great excess in the numbers of its white corpuscles. The case was, therefore, in every respect analogous in its pathology to those described by Dr Bennett, and others, under the names of "Leucocythemia," "White Blood," &c. Demonstrations of the diseased tissues, and of the blood, were shown.

Mr Sanderson was appointed to examine the structures in this case, and report.

FIBROUS TUMOUR OF THE UTERUS, ETC.

4. *Dr W. T. Gairdner* showed the uterus, and a portion of intestinal canal, in a case of which he had not heard any details. The former was affected with fibrous tumours in various stages; the latter showed the glands in the neighbourhood affected with a deposit, which very much resembled cancer. Dr G. hoped to obtain possession of the details at a future period; but the case seemed interesting in reference to the alleged incompatibility of the fibrous tumour of the uterus with the cancerous diathesis.

HYPERTROPHY OF THE TONGUE.

5. *Mr Cobbold* showed several wax casts illustrative of a case of great hypertrophy of the tongue, which underwent a gradual cure by compression, under Mr Crosse of Norwich. The patient, from whom these were taken, was a girl six years old. On admission into the hospital the tip of the tongue protruded nearly three inches beyond the lips, and an inch below the chin, and at the expiration of one month the entire organ was reduced into the cavity of the mouth. The principal treatment employed was gentle pressure by means of bandages, and local astringent applications. The case is mentioned in the last edition of Mr Samuel Cooper's Dictionary. See article Tongue.

MEETING III.—*June* 21, 1851.—Dr BENNETT, President, in the Chair.

REPORTS.

LEUCOCYTHEMIA.

1. *Mr Sanderson* read the following report on Dr Gairdner's case communicated to last meeting of the Society:—

I have carefully examined the structures referred to in Dr Gairdner's communication, and have arrived at results similar to those of its author. The soft light-coloured portions of the spleen, which to the naked eye so much resembled a deposit foreign to the normal structure of the organ, were found to consist of microscopic elements precisely similar to those constituting the mass of the healthy parenchyma. In this as in a few other cases which I have had an opportunity of examining, in which the obvious appearances were similar, I have come to the conclusion that the morbid structure differs from the normal, not in presenting any peculiarities in the elementary forms, but in the proportion which these bear to each other. A comparative examination seems to show pretty distinctly that in the softened portions, while the cellular element is abundant and well developed, the fibrous element, as represented by the trabecular tissue, is deficient or even absent.

From the fact that in the healthy condition of the organ—the cell-form passes by insensible gradations into the fibre, all the intermediate forms between the two being easily observed, we should expect the probable occurrence of an abnormal condition in which the one form should assume the place of the other, or *vice versâ*. Of this the above described lesion seems an illustration.

The lymphatic glands presented nothing abnormal, excepting their increased size.

The blood presented a very large excess of the colourless corpuscles over the usual proportion in which they occur. On adding acetic acid, the so-called nuclei were observed to assume the usual forms. They were found to differ considerably from any element which could be observed in the spleen parenchyma, and not least in the form and size of their nuclei, which last did not exceed from $\frac{1}{6000}$th to $\frac{1}{4500}$th of an inch in diam., while those of the splenic corpuscles measured not less than $\frac{1}{3500}$th of an inch. This circumstance, in so far as it is of any value, militates against the doctrine of those pathologists, who maintain that the colourless corpuscles of the blood, in cases in which they exist in abnormal abundance in connection with enlarged spleen, are directly derived from that organ.

If we consider that the colourless blood-corpuscles, the splenic corpuscles, and the corpuscles of the lymphatic glands, are bodies which, though not identical, are at least analogous, and probably perform the same or similar functions, is it not more reasonable to infer that the circumstance of the simultaneous occurrence of a multiplication of the whole mass of each of these is to be explained by supposing the existence of a cause operating equally on each, than to take it for granted that one cannot be affected excepting through or by means of the other, and to endeavour to bring evidence to prove the existence of an assumed relation, which, even if it were proved, would not bring us one step nearer our object?

Dr Bennett stated that a very important question arose out of Mr Sanderson's report, viz., whether difference in the size of nuclei in cells, was a proof of essential difference in the nature of the cell itself? Considering the great variations which existed in this respect among the same cells, he could not think that such variation could be considered as a ground of specific difference. With regard to leucocythemia this question was important, for to what was the excess of colourless corpuscles to be attributed? Was the change owing to arrest of development of the coloured particles? was it primary in the blood, or secondary,

dependent on the increased growth of one or other of the blood glands? He was inclined to favour the latter opinion, more especially as it was supported by the fact, that in this condition of the blood the glandular structures in relation with it were always hypertropied, whilst this hypertrophy depended more on the excess of the cell than of the fibrous element. Although he believed it was very necessary to be cautious in theorizing on this subject, he thought it very probable that the glandular cell-elements found their way into the blood, and there underwent certain changes, whereby they were converted into the colourless bodies which abounded in the blood, in the pathological condition of that fluid under consideration.

Dr W. T. Gairdner.—I avoided, in bringing this case before the Society, giving any opinion on the connection of the white corpuscles in the blood with those in the spleen and lymphatic glands, because I think that the solution of the obscure questions connected with the development of these corpuscles, can only be looked for in a much wider generalization than any that can be founded on pathological facts like the present. We shall probably not be able to decide upon these questions, until, from embryology and experimental physiology, we have learned with certainty the source, development, and function of the white corpuscles of the blood, and of the vascular glands, in the normal condition. If the white corpuscles in the blood are formed from those in the glands, or the latter from the former, it might naturally be expected that the transition stages would be found in one or other situation. Are they so? I am not prepared either to affirm this, or to deny it. The corpuscles in the blood have much more uniformity of character; those in the spleen and glands, on the contrary, whether in the normal or pathological condition, have so much variety, that I have no doubt all the transition stages might be found among them. But are they found in such proportions as to present a regular series? This is very doubtful; on the contrary, it has appeared to me, that white corpuscles of the exact size and characters of those of the blood are not numerous in the spleen, and that other bodies, larger and smaller, nucleated and non-nucleated, are disproportionately frequent. I have, however, on some occasions seen the spleen much more full than usual of bodies exactly resembling the white corpuscles of blood, or of pus. To some extent it was so in the softened parts of the spleen in this instance; but the most marked case of this condition which I ever saw, was in the body of an elderly man, of small stature and very fat, who for years carried about with him a large swelling in the front of the neck, suspected at one time to be goitrous, but which proved to be nothing but accumulated adipose tissue. The state of the blood was not in this instance ascertained. The spleen was not much enlarged, but soft and pale, and contained a cheesy yellow mass the size of a walnut. The epithelium of most of the glands was very granular. The thyroid gland was present, and in this respect the case differed from two cases of very similar swellings in the neck, published by Mr Curling.

COMMUNICATIONS.

MELANOSIS.

The following communications on this subject were made to the Society:—

1. *Dr Bennett* exhibited to the Society a portion of a foot which had been amputated in the Infirmary by Dr Dunsmure. The patient was an engine-maker aged thirty-nine. About three years ago he observed, as the result of wearing a tight shoe, that there was considerable induration between the third and fourth toes of the left foot. This gradually increased, and a deep fissure occurred in the indurated integuments over the corresponding metatarsal bones. Gradually a tumour formed, which, on admission, was circular, raised above the integument, the size of half-a-crown, hard to the feel, with a circumscribed edge, and posteriorly presented a dark melanotic appearance. It was removed on the

15th of June. On dividing the diseased part, it was observed that the tumour was about three fourths of an inch deep anteriorly, and that of half an inch posteriorly. It presented two distinct characters, the two anterior thirds being hard, white, crunching under the knife, and yielding no juice on pressure; the posterior third being softer, and completely black. A demonstration of the structure was exhibited under three microscopes, showing that the white portion consisted of a dense mesh-work of fibres and fusiform cells, mingled with oval nuclei; and that the melanotic portion consisted of a fibrous stroma, infiltrated with a mass of reddish-brown molecules and granules, several of which were aggregated into opaque masses, whilst a few were contained within cells. Dr Bennett observed that he had no doubt these fibro-nucleated growths would be found on investigation to be more common than was generally supposed, and that their correct history was yet a desideratum. He presumed that the melanotic portion was owing to changes in the tumour following an extravasation of blood, and invited the members of the Society to express their views as to the nature of melanosis.

2. *Mr Murchison* presented to the Society a melanotic cancerous tumour, about the size of a chestnut, attached to the prepuce and glans penis; and also a portion of the pleural surface of the diaphragm from the same patient, covered with morbid deposits of a similar nature. The tumour had been found, on microscopic examination, to possess the ordinary structure of cancerous tumours, except that it was infiltrated with a quantity of dark matter, which under the microscope appeared in the form of numerous Sienna brown granules, both free and also enclosed in cells, in some of which distinct nuclei could be detected.

3. *Mr Drummond* read the following analysis of melanotic matter, from the pleura and lymphatic glands, in the case referred to by Mr Murchison:—

The pigmentary matter presented a dark brown colour, mingled with portions of a light brown, approaching to a red tint.

It was insoluble in water, alcohol, and ether.

When treated with hydrochloric, nitric, and sulphuric acids, it was dissolved—the solution being nearly colourless.

When chlorine gas was passed through it, suspended in water, it was bleached to a certain extent, but not entirely.

When boiled with potash, it dissolved with disengagement of ammonia.

The ultimate analysis yielded the following result:—

Carbon, ...	67.01
Hydrogen, . . .	6.45
Nitrogen, ...	11.45
Oxygen, ...	8.36
Ash, ...	6.73
	100.00

The ash consisted in great part of peroxide of iron.

Mr Barlow stated that melanosis among the lower animals was almost exclusively confined to gray horses. The disease often appears locally at first, and manifests itself on the external parts of the body covered by dark-coloured skin, as the under surface of the tail, anus, margins of the eye-lids. When of longer duration, many of the internal organs, but more especially the mesentery, become involved, and instances are seen where the voluntary muscles are extensively affected. It does not evince any of those characters which in the human subject are taken as indications of malignant disease; on the contrary, unless exposed to mechanical injury, it does not ulcerate nor soften; and when a tumour is freely cut into and partly removed, the portion still remaining will

readily heal. As an illustration of this, he might mention that Professor Dick once amputated a horse's tail as high up as its second vertebral segment; it was a complete mass of melanotic deposit, and weighed 56 lbs. avoirdupois. In this operation a large amount of diseased mass was still left in connection with the anus and croup. This incised surface, however, healed, so far as could be judged, in quite as short a time as an incision of similar extent would have done if made in completely healthy tissues.

Dr Bennett stated that, putting aside that form of melanosis which was observed in the lungs and bronchial glands of colliers and others, and which undoubtedly consisted of the deposition of carbon into the tissue, he regarded other forms of melanosis as consisting essentially of altered blood. It might occur with or without malignant disease. In the former case, blood was extravasated into cancerous growths, and its colouring matter was either diffused through them, or passed into their contained cells. In the latter case, it was infiltrated through the structure, in a granular form, often collected together in masses, and occasionally cells were formed, which contained these granules. In the horse, the cell structures were often very perfect, the granules existing between the cell-walls and nucleus, which remained colourless and transparent. In that animal, he had been informed by Professor Dick, that it was not malignant. From all the facts he was acquainted with, he was led to infer that the black colour of melanosis was owing to some chemical change occurring in the colouring matter of the blood, the nature of which was unknown, and hence why black colorations were so common, under various circumstances, in the body. That it was not sulphuretted hydrogen acting on the iron of the blood—an opinion which had originated from the frequency with which such colorations existed in the neighbourhood of the intestines—was, he thought, shown by the fact that he had discovered them in the centre of the spinal cord, in a case of chronic softening of that organ. On one occasion, also, he had asked Dr Wilson and Dr Douglas Maclagan to test a mass of melanosis removed from the horse for sulphuret of iron. Both gentlemen experimented separately, and concurred in informing him that not a trace of that substance could be found. No doubt further chemical examination of melanosis was much to be desired.

Mr Sanderson remarked that, if the term melanosis were only understood to include those morbid growths which were analogous to the normal pigmentary structures—such as the *pigmentum nigrum* of the choroid—he was not aware of any evidence to prove that melanotic pigment was directly derived from hæmatin—the only circumstance leading to such a conclusion being the similarity in chemical composition, especially in respect of the presence of a considerable proportion of iron in each.

Mr Cobbold said he had examined the colouring matter of true melanosis, and believed it to be analogous to the *pigmentum nigrum* of the choroid coat of the eye, in which structure the dark appearance of the cells was merely owing to the presence of minute granules in their interior, possessing very high refractive properties, and which, when viewed singly, under high magnifying powers, presented a dark broad margin with a central clear space. If the granular material were a transformation of the colouring matter of the blood, we should expect to find the granules homogeneous in appearance, and not presenting the central clear space.

Mr Murchison could not agree with the opinion that melanotic matter was derived in all cases from extravasated blood undergoing change. He thought that the fact of the colouring matter existing in the interior of nucleated cells could not be accounted for by this theory. He agreed that the colouring matter was derived from the blood, but he was inclined to believe that its development depended not on a *mechanical* change in the blood itself, but rather on a *vital* action of the surrounding tissues.

Dr W. T. Gairdner—If we are to regard every morbidly dark structure as an example of melanosis, then there can be no doubt as to the propriety of establishing many distinctions or varieties, and particularly of distinguishing the

malignant and non-malignant kinds. In most of the latter the pigment seems to be derived from that of the blood, though not always in consequence of extravasation. The dark colour of gangrenous parts is a merely chemical re-action of sulphuretted hydrogen on the pigmentary matter of the blood. Of a similar kind are the slaty discolorations found in the parts about the colon in the dead body. Again, the acid juices of the stomach have, as Cruveilhier has particularly pointed out, a tendency to blacken extravasated blood; and the same may be said of the juices of the colon. In both of these situations slate-coloured points or patches are common, not merely where blood has been extravasated, but where it is still within the vessels. The orifices of the follicles of the colon are often surrounded with a narrow rim of slate-colour. I have seen the point of every villus throughout the greater part of the small intestine tinged with the same colouring material, which, viewed under the microscope, was obviously contained in, or in contact with, the terminal vascular loops. In the hemorrhagic erosions of the stomach, the blood on the surface of the ulcer is generally slate-coloured. In old dysenteric ulcers a similar colour commonly prevails. In old corpora lutea and simple cysts of the ovaries there is often a slate-coloured tinge; and in various other situations, under circumstances not fully understood, the blood either within or without the vessels may undergo similar changes. But the colouring matter observed in these cases, even to the most unpractised eye, and still more when subjected to minute examination, differs widely from that observed in the true melanotic *tumours*. This is of a brown tint, like the choroid pigment, not of a blue or green shade, like the other; and is disposed in the form of lustrous angular solid granules, instead of being almost amorphous under high microscopic powers, or diffused in a fluid. I have found it, both in man and in the horse, formed in cells, often of large size and nucleated; although these cells do not exist in all parts of the growth, being often disintegrated, except in the most recent formations. The differences in this respect in the same subject, or at different parts of the same tumour, are considerable; but, making allowances for these differences of development, the nature of this structure in the horse has appeared to me identical with what I have observed in two excellent examples of the disease in the human subject.

Are the melanotic tumours malignant? It is clear that, both in the human subject and in the horse, they have a tendency to appear in considerable numbers, and to attack various parts of the body, the pigment being quite evidently carried along the great lymphatic vessels. They do not, however, spread indiscriminately through the tissues in the neighbourhood of those first invaded, and they are certainly less prone to softening or to rapid and destructive ulceration than most forms of cancer. In the horse it is said that the parts heal rapidly after their excision or even *partial* removal, and that life appears to be but little, if at all, shortened by them. The horse, however, is an animal little subject to destructive or malignant ulcerations of any kind; and it may very well be conceived that the same constitution to which it owes this exemption, may modify the progress of the melanotic growth, and render it less dangerous to life or tissue than in the human being, so frequently the subject of cancer in all its more ordinary forms.

NECROSIS OF THE FEMUR.

4. *Mr Murchison* exhibited a preparation and drawings of a very interesting case of necrosis of the femur, in which the exfoliation of dead bone had penetrated the condyles of the femur into the cavity of the joint, notched the upper edge of the patella, and projected through the soft parts in front of the knee-joint. The patient was a girl, and her limb had been amputated by Mr Syme with success.

URINARY CALCULI.

5. *Mr Murchison* exhibited two specimens of urinary calculi, lately remove by Mr Syme from patients in the Surgical Hospital:—1. A calculus weighi n

1265 grains, the nucleus and external portion of which consisted of lithic acid, and the intermediate portion of oxalate of lime. 2. A calculus weighing upwards of 300 grains, and consisting principally of triple phosphate, with a central nucleus of lithic acid. The latter was evidently the fragment of another stone, around which the phosphates had been deposited, and was interesting in connection with the fact, that the patient had a large stone crushed in his bladder eighteen months before.

ON A PECULIAR ARRANGEMENT IN THE VENTRICULAR FIBRES OF THE HEART.

6. *Mr Zaglas.*—I beg to exhibit to the Society, in the hearts of the bullock and sheep, a curious arrangement of the fibres in the wall of the ventricles, producing an appearance on section hitherto undescribed. If a section be made across the two ventricles of a sheep's heart, and carried parallel to the auriculo-ventricular septa, or nearly so, a phenomenon presents itself to our view, which is both beautiful and interesting. The surface of the section has of course the form of an **8**, the circular halves of which are broadly blended together, to constitute the section-surface of the septum ventriculorum. The middle points of this surface are occupied by a beautiful marking of the same general form, but bearing a resemblance in its details to two circlets of laurel, the branches of which are represented by a tract of central fibres, and the leaves by lateral processes on either side. This marking is distinguished from the remaining surface, namely the outward and inward peripheral points of the section, by a paler colour, and an apparently greater compactness of its substance.

Writers, even monographists, so far as I am aware, do not mention this appearance, most probably because they do not attach any great importance to it. I believe, however, that the student of anatomical structures, in paying attention to it, will be rewarded, in the first place, by the sight of a structure by no means inferior in beauty of arrangement to that of the arbor vitæ; secondly, by gaining a useful aid in remembering the arrangement of the muscular fibres of the ventricles; and perhaps, thirdly, by meeting with a physiological arrangement admirably adapted to give to a certain quantity of muscular substance the greatest efficacy for the propulsion of the blood out of the ventricles, and enable this mass to resist the counter-pressure of that fluid.

The secondary fasciculi of the muscles of the heart are not composed, like those of the voluntary muscles, of parallel primary fasciculi stretched between two tendinous surfaces, that of origin and that of insertion; but they are rather fibrous tracts, composed of elements which are continually entering into new combinations; for most frequently fibres detach themselves from one tract to join some other of the surrounding ones, while these again send fibres to the first. Thus the substance of the heart is a dense meshwork of fibres, which, however, at certain depths, have certain main directions of union and separation. The latter circumstance makes it possible to distinguish layers in that substance, which succeed one another from the external to the internal surface, and are distinguished by an increasing obliquity of their fasciculi or tracts, to a plane passing through the axis of the heart. It is nevertheless necessary to take off a layer of muscular substance of considerable thickness, before arriving at one that has its fibres strikingly differing in direction from that of the one removed; for the transition is made by a gradual increase of the angle at which the superficial fasciculi of the two exposed layers are seen crossing each other, all the intervening degrees being represented by the deeper fasciculi of the removed layer.

Now in the section of the heart, carried in the plane that has been mentioned above, it so happens that the fibres of the middle layer run parallel to the plane of the section, while the fibres of the layers more superficial or more deep, are met with by the cut at an angle increased in proportion to their remoteness from the middle. This parallelism of the fasciculi with the surface of section, by diminishing the apparent number in a given area of interstitial spaces between the fibres, is one cause of the lighter colour in the central points of the section of the

ventricular walls. Another circumstance tending to the same effect is the arrangement of the minuter elements, the ultimate fibres having, in relation to the fasciculi, precisely the same disposition as these last, in relation to the whole wall of the heart.

I shall now say a few words on the arrangement of the fibres, and the purpose subserved by it. Having a heart before us with its apex downwards, we find, looking at it from either side, that the most superficial fibres begin at the sulcus horizontalis, and run downwards, and from our left to our right hand, thus describing an approach to a spiral curve around the ventricles. Let us keep in view one of these fibres, and then go to a deeper layer. The fibre of this second layer, which ought to be covered by that of the first, if both layers had their fibres in the same direction, will be found to form with the latter a very acute angle,—the angle above the point of intersection being to our left, the opposite one to our right, hand. A third layer will present, in its corresponding fibre, the same relation to the second which this did to the first, while to the last-mentioned its inclination will be double; and so on we may proceed, meeting every following layer in the same relation to the foregoing one, and their gradual increase of inclination to the superficial one, till we arrive at the central layer, the fibre of which will be horizontal, and corresponding to the shaft of the laurel-like marking. As the fibres in every layer describe spirals, the turns of these spirals must approach each other in every subsequent layer, until in the last-mentioned they coalesce to perfect circles. Beyond the middle layer the circles will again diverge into spirals, expanding more and more in every following layer. Our fibres, which we keep in view in the direction of tangents to the corresponding spire, will retain the same progressive relation to one another, although their prolongations beyond the point of intersection will exchange sides with reference to the horizontal. Comparing now the most superficial fibre to the deeper one, or the fibres of the two surfaces, we shall find that we have passed through an almost entire revolution. If the whole set of fibres be combined into a continuous structure, a double fan results, which expands to the right and to the left with an obliquity and incurvation of its surfaces corresponding to the shape of the heart, and an axis of rotation for its radii equal in length to the thickness of the wall.

We have had in view one fibre from every layer, and have thus followed but one architectural element of the whole. But since, in every layer, the tracts of fibres are parallel, we can easily see how the double fans are sheathed to build up the walls of the ventricles, and how every two respective points of the external and internal surfaces are united through an axis of rotation for the radii, both the surfaces consisting of such points. Thus, in all the directions from the peripheral points to the centre of a ventricle, the greatest as well as most uniform density of the walls has been attained, and two objects effected which are of great importance for the function of the heart and the safety of the individual. In the first place, the heart is enabled to apply, if necessary, the entire amount of its muscular force to the propulsion of the blood; in the second place, it appears to me that a provision has been made against the formation of diverticula.

CANCER OF UTERUS.

7. *Dr W. T. Gairdner* exhibited a specimen of cancerous ulceration of the uterus, vagina, and bladder, from a middle-aged woman who died in the hospital. The cancerous deposit was limited to the edges of the ulceration, which was very extensive; and, notwithstanding that nearly the whole cervix and body of the uterus, and the greater part of the vagina, were ulcerated, the fundus was quite free from all appearance of morbid deposit. There was an opening between the vagina and the rectum about an inch and a half in length; but this seemed not to be due to the invasion of the rectum by the cancerous deposit, but to the effects of labour which had taken place three months before the death of the patient. There was no cancer in any other organ, or in the lymphatic glands.

The cancerous parts showed, under the microscope, very numerous cells.

chiefly more or less fusiform, with nuclei ranging up to the $\frac{1}{70}$th of a line in diameter, sometimes with evident nucleoli; the nuclei and nucleoli mostly single. (These appearances were demonstrated under the microscope.) Dr G. said that this might justly be called an "epithelial cancer," in respect of its origin in an epithelial tissue, and its tendency to spread through the parts immediately adjoining, producing extensive ulceration, while, at the same time, distant organs were unaffected. Its structure, however, had no particular resemblance to that of epithelium, and resembled closely that found in some forms of medullary cancer.

CANCER OF THE LIVER IN A DOMESTIC FOWL.

8. *Dr W. T. Gairdner* exhibited a specimen of disease of the liver in a duck, accompanied by enlargement of the absorbent glands about the gizzard and commencement of the intestine. The liver was much enlarged, and presented, both on the surface and on section, many distinct tumours strikingly resembling the tubercles of Farre in the human liver. They bore a similar average proportion to the bulk of the organ, being generally about three-eighths of an inch, or half an inch in diameter; they were more or less accurately globular, but most of them, where they appeared on the surface, were either flattened, or had a cup-shaped depression. They were on section like the firmer varieties of Farre's tubercle, in which partial drying up of the cancerous matter has taken place; the colour of a grayish white at the circumference, and ochrey tint towards the centre; the different tints being marked off from one another by irregular lines concentrically disposed. The microscopic appearances could not be satisfactorily made out, as the preparation had been placed in spirit some time before an opportunity of examining it was obtained.

ENCHONDROMA.

9. *Mr Cobbold* read the following narrative, which was illustrated by drawings of the diseased parts:—

I am anxious to detail to the Society a few particulars respecting an enormous cartilaginous tumour, contained in the museum of the Norfolk and Norwich hospital, from a patient who died in that institution. The museum contains also a coloured wax cast, in which I have represented the external characters of the tumour, as they appeared in its fresh state.

The tumour occupied the major part of the pelvic and abdominal cavities, extending from below the tuberosity of the ischium to about an inch above the umbilicus. On further dissection, it was ascertained that the growth extended inwards from the internal surface of the left innominate bone, at a spot corresponding with the pectineal ridge.[1]

To the naked eye, the substance of the tumour was made up of large lobules, presenting an indistinctly cystiform aspect in the interior and outline,—the centre of the mass being denser, and of a more cartilaginous appearance, studded here and there with points of calcareous deposit. The fresh cut surface gave a pale yellowish hue, a tinge of green also being in places perceptible—the cysts contained a fluid of melicerous consistency. A portion of the tumour was forwarded to Professor Paget, to whom I am indebted for the following microscopic characters of the tumour:—

"The part which I received consisted of an aggregate of small masses or nodules, of various shapes and sizes, exactly like those which formed the tumour of the abdomen described in the College Catalogue as No. 207, and in our own, in Series 35, No. 49. Each such portion appeared thinly partitioned from its neighbour, and the outer surface of the tumour was invested with a thickish layer of cellular or fibrous tissue. The cartilage was clean, nearly colourless, and clear; but many of the nodules presented, at their centres, small cavities, with irregular but

[1] The pathological museum of the late Dr Crosse has been purchased by the Museum Committee of the Norfolk and Norwich hospital.

smooth walls, which appeared to be due to the softening of the cartilage, not different from the rest. In firmer parts of the cartilage, I could barely discern the outlines of any cartilage cells—indeed I doubt if there were any—but there were many nuclei, like those in the cells of ordinary cartilaginous tumours, of rather various size, but well formed and granular. These were imbedded in a nearly uniform, dimly granular, ground-glass-like basis, lying as wide apart as they would have been had each been contained in its proper cell, and some much more closely set together. In the parts which formed the walls of central cavities there were no outlines of cells, and very few or no nuclei. The whole substance appeared a plain dimly granular material, in parts being capable of being spread out like membrane. In a few spots this material appeared obscurely fasiculate; in other parts, delicately and very closely *lined*, resembling large muscular fibres (as those of the eel, for example) which have no transverse striæ."

There being some points in the history of the case worthy of notice, I proceed to remark, that several of the long bones were affected with exostosis,—these growths, however, presenting anything but the characters of cartilage, as you will readily perceive on looking at this drawing, which represents a section of one of these bony tumours, attached to the right tibia, and which was of almost ivory hardness; but, on making a section through the longitudinal axis of the head of the left thigh bone, we found the os femoris to be exceedingly soft, while the compact bony margin of the head of the femur, and the cartilage that usually covers it, had (as represented in these drawings) all but entirely disappeared. I must also be allowed to allude to another exostosis, which was situated at the upper and outer part of the right humerus, because in this position the occurrence of such growths seems very rare. Professor Syme remarked, in one of his clinical lectures last winter, after removing an exostosis from a similar situation, that it was the first example he had witnessed of its occurrence during thirty years' experience. This was, however, the second patient at the Norwich hospital in whom I had seen exostosis in that situation.

Further, in addition to the interesting data which the history of the case itself affords, there is this also to be remarked, with regard to the hereditary nature of the disease, that the parents of this individual, as well as others of his kindred, have all more or less been subjected to the debilitating influences of a perverted nutrition. The patient's father (who, I believe, is still living) suffered amputation by Mr Martineau, on account of enchondroma of the lower ends of the radius and ulna; and a brother (also, I believe, still living) is affected with mollities ossium.

The illustrations which, in conclusion, I exhibit to the Society, were taken from sections of the forearm, preserved in the museum of the late Dr Crosse.[1]

Dr Bennett said that the largest specimen of enchondroma he was acquainted with existed in the museum of Mr Lane, close to St George's Hospital, London. Muller considered that this form of growth was not malignant, and never returned. He had met with one case, however, of enchondroma of the arm, in which Mr Syme had amputated at the shoulder-joint, and where the stump healed. Subsequently, tumours of a so-called malignant nature returned in the stump and axilla, and ultimately killed the patient, a girl aged fourteen. He had always considered it most unfortunate that the structure of these secondary tumours had never been examined, as the question with regard to the malignancy of enchondroma would thus have been determined.

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[1] In making these dissections, I was kindly assisted by Proctor Wright, Esq., of Norwich.

MEETING IV.—*June* 28, 1851.—Professor BENNETT, P., in the Chair.

REPORTS.

MECHANISM OF THE PELVIC ARTICULATIONS.

1. *Dr W. T. Gairdner* read the following report by Mr Barlow and himself, on the views submitted to the Society by Mr Zaglas, on the subject of the mechanism of the pelvic articulations:

The prevalent idea in regard to the connection of the sacrum with the ossa innominata is, that it is a wedge placed between these bones all but immoveably, and receiving the pressure from above downwards of the spinal column, while from below upwards, and laterally, it is acted on by the counter-pressure of the limbs, communicated through the curve of the ossa innominata. The balance of forces resulting from this arrangement is often stated in a general way; but we are not aware of any attempts to determine more minutely the statical conditions under which the equilibrium of the body is maintained, still less to take scientific account of the motion allowed by the pelvic ligaments, and especially by the sacro-iliac synchondrosis. It appears, however, manifest that the elastic ligaments which exist in this situation cannot be without use in the economy; and while we do not commit ourselves in all points to an acceptance of the present views of Mr Zaglas, we have no hesitation in stating that these views appear to be a decided advance in physiology, and, for the most part, to correspond well with facts already known, both physiological and pathological.

The extent to which the motions of the sacro-iliac synchondrosis merit consideration, is shown by a very simple experiment of Mr Zaglas, which we have witnessed. In a subject, of which the gluteal regions had been dissected, and the sacro-sciatic ligaments exposed, the lower limbs were immoveably fixed throughout their whole length to two upright parallel bars. On then moving the body backwards from the upright position as far as possible, it was easily remarked that the sacro-sciatic ligaments became perfectly lax, while on bending it forwards they became gradually tighter; and when the body was allowed to fall forward by its own weight, assumed the greatest possible degree of tension. This experiment appears to demonstrate not only that there is considerable motion between the bones above named, but that the motion is of such a character as to place the sacrum in the mechanical position of a lever, of which the fulcrum is some intermediate point in the long axis of the bone, probably (as it appears to Mr Zaglas) about the second sacral vertebra. When the body is in the normal position (erect), the antero-superior end of this lever is very much shortened, or, indeed probably, is abolished, the centre of gravity of the superincumbent weight being brought directly over the fulcrum; but in any inclination, either backwards or forwards, of the body, the antero-superior end of the sacral lever receives a corresponding bias, and the postero-inferior end an opposite bias. Hence it arises that the sacral attachment of the sacro-sciatic ligaments moves in a direction opposite to that of the promontory of the same bone, the ligaments being relaxed (or their attachment to the sacrum thrown forwards) when the promontory moves backwards in connection with the spine, and being tightened when the spine and the promontory are bent forwards.

When we look at the articulating surface entering into the sacro-iliac synchondrosis, we find the mechanical conditions on which this leverage depends. Mr Zaglas has pointed out to our satisfaction that there are on the os innominatum four distinct surfaces of articulation, inclined at certain tolerably constant angles to one another. Without entering too minutely into detail, we may mention that the two antero-inferior of these (or those nearest the symphysis pubis[1])

[1] It is right to mention that we depart (in conformity with the usual ideas of the inclination of the pelvis) from Mr Zaglas' nomenclature of these surfaces. He believes the obliquity of the pelvis in the erect position to be greater than that indi-

correspond to what is commonly called the auricular surface of the sacrum, and are inclined to each other at an angle which looks outwards, and forms a ridge inwards. The two posterior-superior surfaces (or those nearest the spine), which are not so closely connected with the corresponding ones of the sacrum (being separated by a considerable thickness of elastic substance), are also inclined to one another at a similar angle; and there is accordingly a crooked ridge running between the four surfaces, in a direction from the spine to the symphysis. Taking the four surfaces, however, in another relation, it may be seen that the two posterior-superior surfaces are separated from the two anterior-inferior (which constitute the auricular surface) by a *groove* (running nearly parallel with the axis of the sacrum), and are inclined to them at an angle which looks inwards. The consequence of this arrangement is, that while some motion, as will presently be seen, is permitted, any tendency to displacement of the sacrum is entirely obviated, so long as the innominate bones are retained in a due degree of proximity by the pressure of the acetabula, and by their ligaments. In particular, it is obvious that any tendency of the sacrum to be displaced towards the symphysis pubis is met by the resistance of the innominate auricular surface, the anterior portion of which faces upwards and inwards, and, when the body is thrown forwards, receives and supports the whole superincumbent pressure. In this position the anterior part of the auricular surface of the innominate bone acts as a fulcrum to the sacral lever, and all parts of the sacrum beyond it accordingly receive a bias upwards and backwards corresponding with that of the promontory of the bone downwards and forwards. This bias is resisted, first, by the sacro-sciatic ligaments, which, as before-mentioned, become tense in such a position; secondly, by the ilio-lumbar ligaments, which, passing from the posterior part of the crest of the ilium to the last lumbar vertebra, tend to suspend the anterior and superior end of the sacral lever, and limit its motion forwards; and, lastly, by the posterior-superior articulating surface of the ilium, which, inclining downwards and inwards, roofs over the lower end of the sacral bone, and receives its upward pressure through the elastic intervening substance.

Such are what appear to be the most clearly demonstrable and important of Mr Zaglas' views. In the course of our examination into them, we have become satisfied of their general correctness, and of their important relation to several points both of physiology and pathology. Mr Zaglas has, for instance, directed our attention to the fact that in the pelvis deformed by mollities ossium, or rickets, besides the well-known projection forwards of the promontory of the sacrum, the axis of the bone assumes a very acute curve, the portion of it between its first vertebra and the attachment of the sacro-sciatic ligaments being thrown in a marked degree backwards and upwards, while the remaining portion is kept in its original position by the sacro-sciatic ligaments—a condition, of course, clearly referable to the mechanism above indicated. We have observed also, that in some deformed pelves the crest of the ilium presents at its posterior third a very peculiar curve, caused by the promontory of the sacrum bending forward and downward the part to which it is more immediately attached, while the posterior spines of the ilium are raised and pushed backward by the middle vertebræ of the sacrum. Again, a most important physiological deduction from Mr Zaglas' views appears to us to be the following:—The erect position, or that in which the spine is as far bent back as possible, has a tendency to open the brim and contract the outlet of the pelvis, by throwing back the promontory, and forward the coccygeal end of the sacrum; while the bent position of the body has a still greater tendency to enlarge the outlet, and, to a slighter extent, to contract the brim. The application of these facts to the physiology of parturition and of defecation need not be more than noticed.

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cated either by Naegele or Weber; considering, in fact, the axis of the first three vertebræ of the sacrum to be, when the body is erect, nearly or quite horizontal. We do not express any opinion on this view, which was not necessarily brought under our consideration in connection with the present subject.

In conclusion, we would strongly recommend Mr Zaglas to pursue his inquiries in the direction of comparative anatomy, and particularly to observe the modifications of form of the pelvis and its articulations in quadrupeds, whose permanently prone position does not permit the spine to be bent forwards, nor, consequently, the leverage of the sacrum to be thrown into action in this direction.

COMMUNICATIONS.

LAMINATED URINARY DEPOSIT.

1. *Dr Bennett* showed a specimen of urine from a patient in the clinical wards. It contained urates in a form very similar to that described by Dr Gairdner at the first meeting of the Society; and a number of scale-shaped bodies, which appeared to the naked eye to float in the urine, were made up of small rounded deposits of urate of ammonia, imbedded in some intervening substance. The case was one of scarlatina. (See Dr Bennett's clinical lecture for August 1851, "Monthly Journal of Medical Science," p. 158.)

Mr Drummond was appointed to report on the deposit.

ALBUMINOUS URINE IN PNEUMONIA.

2. *Dr Bennett* also showed a specimen of albuminous urine, containing tube-casts and epithelium of the kind common in kidney disease. It was from a patient affected with pneumonia, in whom the urine had become albuminous in the stage of resolution. Dr Bennett considered the tube-casts thrown off in these cases to be derived from the fibrin which was in the act of being absorbed into the blood from the lung.

CHANGES IN EXTRAVASATED BLOOD.

3. *Dr Sanderson* showed the result of an experiment which he had now several times made on the brain of the pigeon. In this case he had five days ago punctured the cerebellum with a needle, and presented to the Society the parts involved in the operation, which showed limited softening, with some hemorrhagic discolouration of the nervous substance. Under the microscope, Mr Sanderson demonstrated several aggregations of blood-globules, to the number of three or four, in each of which a delicate membranous structure was found to surround the whole contained number of globules. (See Dr Sanderson's paper, in "Monthly Journal of Medical Science," September 1851, p. 216.)

Dr W. T. Gairdner was appointed to report on this observation.

FOSSIL BONE.

4. *Mr Cobbold* exhibited several sections of fossil bone taken from the Red Crag deposit of Suffolk, in which the corpuscles and canaliculi were unusually well-marked, and which presented all the characters of mammiferous bone.

CYSTIC TUMOUR OF THE EYELID.

Dr Sanderson described and exhibited the structure of a small cystic tumour removed from the eyelid by Mr Walker. It consisted externally of a fibrous cyst, with numerous septa, containing oval yellowish bodies about the fortieth of a millimetre in their longest diameter, mingled with numerous irregularly-shaped lamellar bodies, varying greatly in size.

Dr Bennett was of opinion that this was a form of epithelial growth, which he had described in his work on cancerous and cancroid growths as occasionally occurring in ducts and follicles. In this case he believed occlusion of a follicle had occurred, while its contents had increased and caused it to swell—thus proving a cystic tumour. Epithelium was then formed in large quantities, which accumulated frequently in concentric laminæ, round adipose, and other cells, and in course of time, by means of compression and disintegration, presented the various forms now shown under the microscope.

A long discussion now ensued between Dr Sanderson, Dr Gairdner, and Dr Bennett, as to the nature and mode of development of the various structural elements contained in these growths. Further researches, it was agreed, were necessary, and Dr Bennett undertook the inquiry, and engaged to report the results at a subsequent meeting.

Meeting V.—*July* 5, 1851.—Professor Bennett, P., in the Chair.

REPORT.

URINARY DEPOSIT.

1. *Mr Drummond* reported on the urinary sediment shown by Dr Bennett at last meeting, that chemical analysis showed the presence of a large quantity of uric acid in combination with ammonia. He had not been able to detect any other important ingredient in the matter subjected to examination.

ORIGINAL COMMUNICATIONS.

EMBRYOLOGY.

1. *Dr Bennett* showed a series of preparations illustrative of the development of the chick in ovo. The larger proportion of them had been given to him by Mr Jones, and had gained the prize in his physiological class; but a number of them were presented to him by Mr Drummond, particularly one showing very well the structure of the amnion.

STRUCTURE OF NEW VESSELS IN FALSE MEMBRANE.

2. *Dr W. T. Gairdner* exhibited under low microscopic powers a portion of a false membrane, dried on glass, so as to show vessels filled with blood running within it. In regard to this preparation, Dr G. made the following statement:—

The membrane now presented to the Society is one of a kind not very uncommon. It was found within the arachnoid cavity, in contact with the inner surface both of its visceral and parietal layer, and so disposed as to enclose between its folds a large clot of blood which had been extravasated (probably from the longitudinal sinus) into that cavity. The case is of some interest; but as its details do not involve any new scientific principles, it is not necessary to allude to it farther than to say that the fatal disease was distinctly referable to an injury received five weeks before death, and by which the patient, a man sixty years of age, fractured his humerus. The head symptoms came on gradually in the form of coma, with typhoid febrile symptoms, but no delirium. There is, therefore, no reason to doubt that the membrane was in this instance of hemorrhagic origin, as in various other cases related by authors, and referred to in an excellent paper by Mr Prescott Hewett, of St George's Hospital, in the twenty-eighth volume of the "Medico-Chirurgical Transactions." The existence of vessels in such membranes has also been shown by injection, in a preparation by Mr Holmes Coote, in St Bartholomew's Hospital, as well as by others in St George's Hospital Museum. Although, therefore, there is nothing new in the facts now visible or demonstrable in regard to this membrane, the Society may find the following observations, made while the specimen was recent, not devoid of interest:—

The portion of membrane examined was about two inches square, being all that could be preserved. It was removed from the surface of the dura-mater and falx cerebri, and had at one place a transverse irregularly varicose streak, of purple colour, quite obvious to the naked eye, but scarcely so defined or sharp in the edge as to have the character of a vessel. Crossing this, however, on a

different plane, were a great many smaller branching vessels, still visible to the naked eye or a simple lens, and with a very defined outline.

On submitting a portion of the membrane at this part to a power of forty diameters, the walls of the smaller vessels could be very distinctly seen as a well-defined clear space on each side of the red streak which marked the *channel* of the blood. In the larger and varicose blood-channel, however, no distinct wall of any appreciable thickness could be traced; nor could any be decidedly said to be visible even under higher magnifying powers.

A small portion of the membrane, containing some of the smaller and more distinct vessels, was dissected out on glass, and treated with acetic acid. Examined under a power of two hundred and fifty diameters, it had the general structure of fibrin. In most parts there were traces of elongated nuclei, but these were in no great numbers, and not well-marked, except at the site of the vessels. Here the nuclei were disposed in a longitudinal series in the axis of the vessel, showing the wall to be altogether composed of longitudinal fibres. The nuclei were in some parts very much elongated, forming twisted wavy fibres.

I squeezed some blood out of the largest vessel, and examined it under two hundred and fifty diameters. It showed many well-formed blood corpuscles; but it appeared to me that I could trace them distinctly from the very smallest appreciable size up to that of the normal blood corpuscle. Except in size, I did not see much difference between what I suppose to be the young and the perfect blood corpuscles; but the number of those of the inferior or intermediate sizes was, I think, decidedly greater than in normal blood.

There were few or no white corpuscles.

Besides these elements, there were very many irregular-shaped coloured granules of various sizes, up to $\frac{1}{100}$th of a line, such as are found in many circumstances along with disintegrating blood. They were easily distinguished from the blood-corpuscles by colour, form, and re-action with acids, which they resisted. These granules were scattered throughout various parts of the membrane, to which they appeared to communicate the rust-coloured mottling. Although, therefore, I think they were also floating free in the blood of this large vessel, I am not *positively* able to demonstrate that they were so in a manner free from possible fallacy.

Another element found in the matter squeezed from the vessel was a certain number of those very delicate hyaline cells, which frequently occur in pathological exudations, and which I have generally called simple transparent or soap-bubble vesicles. They were invariably non-nucleated, and had all varieties of size up to $\frac{1}{150}$th of a line.

This observation presents several points of great interest bearing on the still unsettled questions of the origin of new blood and blood-vessels. In regard to the blood taken from the most considerable vessel, it is to be observed that it differed from normal blood—firstly, in the very varying size of the red corpuscles, and in the great number of such corpuscles which were much smaller than the normal type; and secondly, in the absence of white corpuscles. It is difficult to understand on what principle these differences can be explained, except by supposing the blood in this vessel to be *young blood*, formed within the false membrane in a vessel as yet unconnected with the circulation. This inference would have been still farther probable had the observation that coloured granules of disintegrating hematin existed in this blood been free from a possible fallacy; for it is obvious that had the new vessels been in contact with the general circulation, no such granules could have existed in their blood. Admitting for a moment the inference correct, that this was actually young blood, it is clear that this observation would directly disprove the development of the red corpuscles from the white, and would tend to show that the latter are not in any way necessary to the development of the blood.

A somewhat similar observation has been published by Vogel,[1] in regard to

[1] Pathological Anatomy. Dr Day's Translation, p. 549.

small points which he found in a granulation on the end of a bone, and which he supposed to be newly-formed blood. But in this case neither was the blood enclosed so distinctly in a new vessel as in the present instance, nor was it apparently so characteristic a specimen as regards the different stages of growth of the red corpuscles.

With respect to the new vessels, it is worthy of observation that the smaller ones had in this case more perfect walls, and were evidently more advanced in development than the larger varicose tubes from which the blood was taken for examination. This fact appears to be quite at variance with any theory of the formation of new vessels by peripheral extension from the older ones; as, according to such a theory, the smaller capillaries would be first formed, and some of them would gradually become developed and widened into more considerable channels, acquiring, at the same time, thicker and more complex walls; so that in all cases the progress of development in the walls of a vessel would necessarily be in exact proportion to its size and its proximity to the original tissue. Such a relation undoubtedly prevails to a certain extent in the new vessels formed in granulations on a free surface; but in observing the vessels of false membranes, I have repeatedly been struck with the fact that no such relation can be traced. On the contrary, the new vessels in a false membrane appear to be channelled out, as it were, in the direction of its fibres, and without any reference to the vessels of the adjacent structures; and may be occasionally seen in regularly arranged groups of five or six long parallel vessels, all of them of considerable diameter, but of most rudimentary structure, and totally destitute of transverse fibres or nuclei, throughout their entire length. From the present preparation it appears that the vessels of most considerable size may even have the most rudimentary structure, and from an examination of other specimens I am satisfied that the development of such vessels may be quite as far advanced in the more distant parts as in those close to the parent membrane. From these circumstances it would appear probable that the vascular structures in a false membrane, instead of being the result of a series of developments from the capillaries of the parent tissue, are independent formations, and are as much involved in the ideal plan (if I may use the expression) of the membrane, as the chimneys of a house, or the streets of a city.

John Hunter supposed that, in the organization of extravasated blood, vessels were formed in the same way as in the membranes of the chick, where they take their origin independently of each other, but following a harmonious arrangement, and afterwards combining into a system. Although the proofs of this doctrine were at the time, and perhaps still are, deficient, I must confess that the results of observation, as well as considerations of analogy, incline me strongly to adhere to it, and even to extend it to the case of granulations, which that great physiologist, as well as many modern observers, have viewed as receiving their supply by an extension of the subjacent vessels. It is difficult to conceive of any direct evidence being led on this subject, except by the multiplication of observations like the present, under perhaps even more favourable circumstances. If it can be established by repeated and independent observations, that the newest vessels of false membranes are often of considerable size from the first, and contain a blood having all the characters of a new formation, the conclusion will be irresistible, that both the blood and the vessels containing it are developed from germs within the new structure itself. Without wishing to rest so important a conclusion upon the above observation alone, I have thought that these facts ought to be laid before this Society, where they may probably be the means of attracting additional attention to the subject.

ON THE TERMINATION OF THE SMALLEST SPLANCHNIC NERVE IN A CASE WHERE THE CORRESPONDING KIDNEY WAS SITUATED IN THE PELVIS.

3. *Mr Zaglas* mentioned to the Society the following details of a dissection he had lately performed, illustrating an abnormal distribution of the nerves of the abdomen.

It is not a very rare occurrence to find a kidney situated lower down than usual, and repeated observations have been published in which it had descended even into the small pelvis. In a case which, in the course of the last winter, presented itself in the dissecting rooms of the Edinburgh University, the left kidney of a male middle-aged subject, was found lying across the common iliac vessels, and bending over so as to apply its lower half on the contiguous parietes of the small pelvis. An artery from near the bifurcation of the aorta, and another from the common iliac, supplied it with arterial blood.

In this case I was anxious to ascertain its supply with nerves, and chiefly to see how the smallest splanchnic nerve, which usually joins the renal plexus, would terminate. The nerves surrounding the above-mentioned arteries had contracted connections with the aortic and hypogastric plexus, and with corresponding sympathetic ganglia of the main cord. The splanchnic nerve did not join them nor any other abdominal plexus. It emerged from amongst the fasciculi of the left crus of the diaphragm, and was seen stretching some distance downwards along the crus and the psoas muscle, which latter it then entered. I now followed the nerve within the substance of the psoas, in a direction downwards and backwards towards the spinal column, and was satisfied that it gave no off-set to the muscle. When near the column, the neurilemma of the nerve began to form an aponeurotic expansion, which then gradually coalesced with the tendons of origin of the psoas muscle and with the periosteum of the lumbar vertebræ (I think of the third and fourth), and thus became effaced.

The man died dropsical, but with no appearance, at least no prominent structural alteration, of the kidney concerned here, which on the contrary, seems to have perfectly fulfilled its office in the economy for a long period without a connection with the nerve. Beyond this statement, perhaps, nothing can be said with certainty in the present state of obscurity in the anatomical relations of the sympathetic system.

With regard to the genetic process of this abnormity, the following may appear tolerably correct. Whatever the cause was that produced the displacement of the kidney, it also caused the separation of the kidney from the nerve, and this in a primordial stage of development, when the muscles had not as yet acquired their distinctness. The nerve then became blended with the spinal column, and afterwards (when the psoas had advanced in its development) was overlapped by that muscle and comprehended between its fasciculi.

SPECIFIC DISTINCTIONS OF CELLS.

4. *Dr Bennett* introduced the subject of the nature and character of cells, normal and pathological, with a view especially to the determination of the grounds on which it might be argued that specific distinctions existed between the different varieties of cells known. The questions touched upon by Dr Bennett led to an animated and protracted conversation, in which Mr Zaglas, Mr Cobbold, and Dr W. T. Gairdner took part.

Meeting VI.—*July* 11, 1851.—Dr Bennett, P., in the Chair.

COMMUNICATIONS.

LEUCOCYTHEMIA.

1. *Dr Bennett* exhibited a microscopic demonstration of the blood from a patient in the clinical wards. The white corpuscles were in excessive numbers, though not to so considerable an extent as in other specimens shown to the Society.

COMPLETE CONGENITAL FISSURE OF STERNUM.

2. *Dr Bennett* showed a preparation of a sternum from a female, in whom the bone was cleft throughout perpendicularly in the mesial line, owing to malfor-

mation. The xiphoid cartilage was also cleft. The two halves of the bone were in contact at the lower end, and diverged to the extent of several inches superiorly.

Mr Zaglas was appointed to report on this case.

RETENTION OF OVUM AT FULL PERIOD IN THE UTERUS OF A COW.

3. *Mr Barlow* exhibited twin fœtuses taken from the uterus of a young and apparently healthy cow, which, when killed a few days ago, was not known to be pregnant. Judging from the state of their dentition and development of the hoofs and bones, they must have died in utero about the expiration of the natural period of gestation. Their heads, necks, and extremities were doubled upon the bodies, so as to occupy comparatively little space. The skin, muscular tissue, and viscera, were dried and shrunk into less than one-fourth of their natural bulk and weight, and formed a tough, brown, almost homogeneous substance, adhering closely to the bones, which could be plainly felt and separately distinguished. They were closely invested by dried membranes, which were smooth, shining, slightly hardened, moistened with a mucous secretion, but unattached on their uterine surfaces. Each fœtus was accurately notched or fitted to the other, and adhered to it by means of the membranes and an intervening glutinous substance, so that the two were moulded into one ovoid mass (quite destitute of external inequalities), about the size and shape of a large gourd. As no history of this case could be arrived at, it was impossible to speak as to the period during which this dried or mummy-like fœtal substance had been retained in the uterus. Comparing, however, the appearances here exhibited, with those seen in instances wherein the records of gestation were known, it is likely that the fœtuses in question have been contained in the uterus at least six months beyond the natural time of parturition. Cases of death of the fœtus and its subsequent retention in utero, are far from unfrequent in domestic ruminants, and in some instances the periods of retention have been known to extend so long as twelve and even eighteen months beyond the natural gestatory period. It is also somewhat remarkable that cows and ewes, in this condition, will often fatten with rapidity, and evince all the usual indications of good health.

ON THE EXISTENCE OF CILIA IN THE VITELLARY MEMBRANE.

4. *Mr Drummond* read the following communication, which was illustrated by drawings:—

When the ovum of batrachians, after it has been deposited by the female, is examined with the naked eye, it is found to consist of a dark-brown spherical mass, of about $\frac{1}{12}$ of an inch in diameter, surrounded by a layer of a gelatinous or mucus-like substance, $\frac{1}{8}$ inch in thickness. The internal dark mass corresponds to the vitellus; the outer gelatinous substance is not analogous to the albumen which we find surrounding the egg and yelk of the birds, inasmuch as it does not appear to be albuminous in composition, but presents more the re-action of gelatine or mucus. It does not coagulate when boiled; on the contrary, it dissolves almost completely. It is probable, therefore, that it is only a layer of mucus serving as a protective covering to the vitellus. When the egg is examined more carefully, and with a power of about thirty diameters, we find that the outer or mucus-like layer is not in contact, by its inner surface, with the vitellus, but that there is a space left between the two. This space is limited internally by the membrane of the vitellus, and externally by the inner surface of the mucus-like layer, which latter presents here a very distinct well-defined margin all round, as if it were lined by a membrane. In this space, between the vitellus and mucous layer, which is filled with fluid, I observed that the particles of dust which were contained in the fluid, were moved about with a constant and rapid motion, and that sometimes the whole vitelline mass was rotated around its axis. On examination with a power of 250 diameters, these movements were found to be produced by the action of vibratile cilia which covered the whole outer surface of the vitellus. I endeavoured to ascertain the

exact time at which these cilia made their appearance; but as the season was somewhat advanced, I could not find eggs young enough for the purpose. With respect to what becomes of these cilia, as the outer membrane of the vitellus is developed into the skin of the frog, the cilia which clothed the vitelline mass I found remained as appendages to the skin of the animal for a considerable time after it left the egg stage. At first they clothed the entire skin of the animal just as they had done the vitelline membrane, but disappeared by degrees; those covering the branchia remaining longest.

It is interesting to observe that Bischoff has noticed a somewhat similar appearance in the ova of the dog. He observed that the vitelline mass in the ovum of that animal, whilst passing along the Fallopian tube, presented a series of rotatory movements; and on examination with high powers, found these to be produced by the action of cilia which clothed the surface of the vitelline membrane. He was not able to ascertain what became of these cilia afterwards, or when they disappeared, and he believes that their office was to assist the ovum in its passage to the uterus.

On consulting the paper of Lebert and Prevost on the development of eggs of the batrachians, I find that they also had already noticed the vibratile cilia; but state that they could not ascertain that the cilia were attached to any particular series of cells. That they are, however, attached to the cells forming the covering of the vitellus, is, I think, without doubt; because, when the vitellus is broken up, I have seen the cells which composed its membrane moved about over the field of the microscope by the action of the cilia attached to their surface.

MELANOSIS.

5. *Dr W. T. Gairdner* showed a drawing, illustrating a remarkable case of melanosis of the skin. It occurred in the integuments of the right leg, in the form of dark-coloured tubercles of the usual form, closely aggregated together, and at some points ulcerated. A similar diseased condition was found in the inguinal and lumbar glands, lungs, and pleuræ. The melanotic matter presented the structure described at a former meeting.

ON A PECULIAR FORM OF CYSTIC DISEASE.

6. *Dr W. T. Gairdner* showed a drawing of a very singular elongated serous cyst, found in the anterior layers of the great omentum of a woman who died of fibrous tumour of the uterus. The cyst was preserved in the University Museum. The patient died very unexpectedly, with symptoms resembling peritonitis; but neither this, nor any other disease sufficient to explain death, was found on dissection, the details of which are given below:—

Large Fibrous Tumour of Uterus, containing Cysts; Cysts in Omentum, in Cellular Tissue, and in Velum Interpositum (Pineal Gland?).

The dissection (*April* 4, 1851) was unavoidably hurried and imperfect.

A woman, æt. 37, pale, but not emaciated.

On opening the abdomen, a very large resisting tumour appeared, having nearly the size and relations of a uterus in the seventh or eighth month of pregnancy. The surface was tolerably smooth, not nodulated, and was covered by peritoneum. The peritoneal sac contained only an ounce or two of very slightly turbid fluid, without any flakes of appreciable size. The surface of the serous membrane not abnormally congested. The tumour could be readily lifted out of the abdominal and pelvic cavity, when it was seen to be attached inferiorly to the uterus. It had no adhesions, except one at its lower third, to the edge of the omentum, which presented a singular arrangement. It did not cover the tumour in front except at the lower part, and when drawn out, was found to be stretched over the right side and back part of the tumour, from which it emerged into view at the lower and right margin. The omentum was remarkably thin and elongated, so much attenuated at most parts

that its individual layers presented rather a fine network than a continuous membrane.

To the anterior layer of the omentum was attached a remarkably long and narrow cystic structure, of generally tubular form, slightly rounded and closed at either extremity, and presenting at some points partial constrictions with intervening gibbosities, in some degree like the external surface of the distended colon. The length of this cyst was between three and four feet, its breadth varying from half an inch to an inch. It was apparently covered by the anterior layer of the omentum, as its external surface showed numerous branched vessels, which communicated with an artery and vein, the size of a large goose-quill, running within the omentum, at the upper border of the morbid structure. The walls of the cyst, as seen externally, were therefore composed of the special membranous cyst-wall and the thin omental vascular layer; they appeared semi-transparent, and allowed the contained clear fluid, with numerous floating flakes, to be readily seen. The upper end of the cyst, which was the larger, was situated near the middle point of the omentum, where it was attached to the stomach. From this point it descended, passing towards its left border, and from this towards the right, keeping near, but not in contact with, the free border of the omentum. No trace of any other solid contents than the above-mentioned flocculi could be seen in any part; the cyst was not, however, cut open through its whole length (being preserved for the University Museum by being injected with spirits); notwithstanding this circumstance, the transparency of the parietes permits of its being said, with confidence, that no considerable organic structure could have existed in the interior or attached to any part of it without being observed. A small portion of the cyst was cut open, when it was seen to be lined internally by a very thin and very smooth membrane, precisely similar to that commonly found in simple serous cysts; the external constrictions corresponded to slight membranous projections like very imperfect septa; but it could be ascertained that fluid communicated freely between all parts of the cyst, which was nowhere subdivided by any approach to a complete partition. Some of the flocculi from the interior of the cyst, on examination by the microscope, presented a filamentous appearance, with some imperfect nuclei and cell-structures, but no trace of any more perfect organisation.

The intestines appeared healthy, but were not examined. Liver, kidneys, spleen, pancreas not examined.

The uterus was considerably elongated (to three or four inches), and at its fundus the above-mentioned tumour was attached to it. Imbedded in its muscular substance were several smaller tumours, none of them exceeding the size of a hazel-nut. All of them, as well as the larger one, presented on section the usual appearance of the uterine fibrous tumour. In the largest growth there were several irregularly-formed cysts, containing a matter like recently coagulated fibrin, containing in its meshes much clear fluid. (Under the microscope, some cell-structures were visible in it, but nothing characteristic or approaching in character to pus.) The large tumour was fed by numerous very large vessels, some of them not less in size than a goose-quill. The interior of the uterus contained some grumous blood, without coagula; but the mucous membrane presented nothing abnormal.

The ovaries were both enlarged to the size of walnuts, and congested. They contained likewise a few simple cysts.

Bladder and urethra not examined.

The thoracic organs (heart and lungs) were free from disease, except that the latter were of small bulk, flaccid, and scarcely crepitating posteriorly. The bronchi contained a slight excess of mucus, and their membrane was very vascular.

In both groins, immediately above Poupart's ligament, there was present a cluster of cysts in the cellular tissue, of irregular form, and containing watery fluid, with numerous fibrinous flocculi of a yellowish colour. The lymphatic system in the neighbourhood appeared quite normal. The chain of femoral lymphatics was examined in the left limb, and found normal.

The brain and its membranes were carefully examined. The nervous tissue was mostly very firm and natural in appearance, but rather pale. Fluid on the surface moderate; in ventricles very small in amount. The choroid plexus and velum interpositum remarkably pale; in the folds of the latter, occupying as nearly as possible the situation of the pineal gland, was a semi-transparent cyst, the size of a wild cherry, and oval in form. The lower wall was somewhat thicker than the upper; it had a small cellular pedicle, which connected it with the surrounding vessels, and adhered to them also by its entire surface, which was slightly flocculent; it appeared to contain a watery fluid. In the neighbourhood of this body was a slight thickening of the velum interpositum, which may have been the atrophied pineal gland; it was not particularly examined. The base of the brain and the arteries normal. The interior of the cranium unusually smooth, and free from all trace of osteophytes.

Dr G. remarked that he was not aware of any thing in the records of morbid anatomy at all resembling the peculiar elongated cyst in the omentum in this case. Its length, and the peculiarity of its form and situation, suggested irresistibly the idea of its being a parasitic structure; but if it was to be regarded as an entozoon, then it must be one of unusually simple organisation, and more analogous to the ordinary rounded serous cysts than had yet been described. The conjunction of it with other forms of cystic disease, which, though not unique, were sufficiently uncommon, made this case one of unusual interest both to the scientific pathologist and to the comparative anatomist.

Meeting VII.—*July* 19, 1851.—Professor Bennett, P., in the Chair.

COMMUNICATIONS.

CANCROID GROWTHS.

1. *Dr Bennett* made some remarks on the existence of a class of tumours to which the name of *cancroid* was applicable, inasmuch as they very closely resembled true cancer in their more apparent characters, and often also in their tendency to a wide-spread distribution, while structurally they were very different from the ordinary types of cancerous growths. He thought it a matter of the utmost importance, that structures which differed so much from each other should be studied with regard to their symptoms, progress, liability to return after excision, and susceptibility of undergoing spontaneous disintegration, instead of being, as they are at present, all confounded together under the term malignant. It had been stated by Müller that enchondroma was not liable to return, but he had recorded a case in his work "On Cancerous and Cancroid Growths" (Obs. 48), where a cartilaginous tumour of the humerus had been amputated, and yet where a disease apparently similar had returned in the axilla and neighbouring parts, and destroyed the patient. Unfortunately this secondary growth had not been examined microscopically, so that, strictly speaking, it had not yet been clearly demonstrated that enchondroma was malignant, although the case in question rendered this probable in some instances. He considered there could be no doubt that epithelial growths were occasionally susceptible of being propagated to the neighbouring glands, of ulcerating and producing death exactly in the same manner as tumours really cancerous. He believed that, as exact observations extended, other forms of structure differing from cancerous, cartilaginous, or epithelial growths, may be found also malignant in the usual acceptation of that term. In proof of this, he related two very remarkable cases, in both of which death had been occasioned by apparently an encephaloma, in one instance attacking the lung and in the other the ovary.

The first case was recorded in Obs. 43 of his work, "On Cancerous and Cancroid Growths." It was that of a young woman, who had a fungous tumour of the leg, which was amputated by Mr Norman, of Bath, the stump healing with-

out accident. Dr Davies of that city had sent Dr Bennett a portion of the tumour, the structure of which is described and figured in the work referred to. It consisted "of fusiform corpuscles in different stages of development, mingled with naked nuclei, a multitude of molecules and granules, and a few blood globules. Some corpuscles were of oval form, others elongated and caudate, others truncated at one end, or spindle-shaped. None exceeded the 1-200th of a millimetre in breadth; and in length they varied from the 1-100th to the 1-25th of a millimetre. Several contained a minute granule, about the 1-500th of a millimetre in diameter. On the addition of acetic acid, most of the loose molecules and granules were dissolved, and a faintly fibrous structure produced, in which oval bodies were scattered, varying, in their longest diameter, from the 1-100th to the 1-50th of a millimetre."

The structure in consequence in no way resembled cancer; yet two years afterwards disease of the lung commenced, and she died with all the symptoms of cancer of that organ. On examination, an encephaloid tumour of the lung was found, a portion of which was kindly sent to Dr Bennett by Dr Davies, who with Mr Norman attended the case, and on microscopic examination it was found to possess exactly the same structure that was previously described as forming the tumour of the leg.

The second case was that of a woman who died of encysted tumour of the left ovary, a portion of which was sent to Dr B. by Mr Russel of Birmingham. It exactly resembled encephaloma, being pulpy in consistence, white in colour, and yielding a copious milky juice on pressure. The other ovary presented an incipient condition of the same morbid alteration. On microscopic examination, it was found to consist of masses of columnar epithelium, which had undergone more or less of the fatty degeneration, and were loaded with oil granules. These were arranged side by side, and frequently presented in the juice, squeezed from the surface of the growth, a concentric arrangement, which would be best understood by examining the drawings exhibited. Associated with this epithelium was a multitude of diaphanous bodies, varying greatly in size,—in some of which oil granules had also accumulated, so that many of them presented all the characters of compound granular corpuscles. No trace of cancer cells could anywhere be discovered. Of this singular form of growth Dr Bennett had now seen two other examples, both of which had occurred in the ovary.

In conclusion, Dr Bennett stated that it was only by multiplying such observations, and determining, in the first instance, the structure and progress of the different forms of malignant growths, that we could ever hope ultimately to arrive at the mysterious laws which governed their origin and propagation.

In the conversation which followed, *Dr Robert* of Marburg (visitor), and *Dr W. T. Gairdner*, made remarks; and it was agreed to take up the important subject of cancer, and malignant growths generally, at a special meeting, on some future occasion.

EXPERIMENTAL INQUIRY INTO THE EFFECTS OF VARIOUS ANIMAL MATTERS INJECTED INTO THE BLOOD.

2. *Mr Millington* laid before the Society the following experiments and remarks:—By the invitation of the President, I am induced to bring before the Society the results of some experiments that I have made, to determine the effects of certain animal fluids on the blood. The Society is aware that the formation of numerous small abscesses in the viscera, especially in the lungs and liver, and the dangerous constitutional symptoms that accompany them, so frequently observed after operations, parturition, and diseases attended with suppuration, have of late been pretty generally referred to the entrance of purulent matter into the blood. But the manner in which pus acts in these cases has been much disputed. The numerous disseminated abscesses of the viscera have been usually explained by the mechanical arrest of the pus globules in the capillaries of those organs. This opinion is based upon the well-known physiological fact, that foreign substances, entering the blood, and failing to be discharged by the natural emunctories of

the body, collect, as on a filter, in the capillaries of the lungs or liver, and give rise to inflammation there, for their elimination. This view was thought to be established by the experiments of Cruveilhier, who introduced metallic mercury into the veins of living animals with the effect of producing in the lungs or liver numerous small abscesses, each containing a small globule of mercury, according as the metal was introduced into the general or portal circulation. Mr Lee, of London, was the first to call in question this mechanical explanation of the *modus operandi* of pus; and he has the merit of first demonstrating, by actual experiment, that when pus is added to living blood it causes its speedy coagulation. Mr Lee expresses the opinion, that this effect of pus on blood is most marked when the pus is in a fœtid state; and that, when introduced into the system, it acts by imparting its own condition to the blood.

From a sense of the practical importance of the subject, I have availed myself of the extensive opportunities the Royal Infirmary affords for prosecuting an inquiry into the pathology of the disease; and with the view of guarding against many fallacies incident to all investigations of this kind, I have made numerous experiments, not only with pus, but with various animal and vegetable fluids, &c. It would of course be here quite out of place to enter into the details of all my experiments; and I shall therefore content myself with some general remarks, and bring before the Society an experiment performed at 7 A.M. this morning, which shows the effects of fresh pus, putrid animal fluid, and bile, on the blood. The particulars of the experiment are briefly as follows:—The integuments of the neck of a living animal having been quickly reflected, one of the jugular veins was readily opened, and six ounces of blood were allowed to flow into a vessel containing half an ounce of unequivocally fresh pus; the same quantity of blood was received into a second vessel, containing half an ounce of moderately putrid animal fluid; a similar amount of blood was received into a third vessel, containing half an ounce of bile. The contents of the vessels were now gently stirred with glass rods, and the changes observed in the blood were carefully noted. That to which the pus had been added began to coagulate almost immediately, in a manner which is quite peculiar, and which I have had repeated opportunity of witnessing. Its colour also underwent a change, becoming slightly darker. The blood to which the putrid fluid had been added became immediately very dark, but did not begin to coagulate until after the lapse of some minutes. The blood which had been mixed with the bile was quickly changed to a brownish-black colour, but it evinced little tendency to coagulate, though it remained for hours undisturbed.

The Society will see, in the blood placed on the table, a corroboration of these statements. In this vessel, containing the blood to which pus has been added, it will be seen that there is a firm crassamentum, which has a peculiar striated appearance, owing, as the demonstration now under the microscope shows, to the aggregation of the pus globules. The crassamentum often contains in its interior small rounded masses, harder than the remaining part of the clot, and which, when examined by the microscope, are also found to consist almost entirely of pus globules. These effects are characteristically produced when the pus is quite fresh; and, judging from my own experiments, there appears no doubt that putrid matters of all kinds retard coagulation; and that the crassamentum formed by blood to which putrid matters have been added, possesses certain distinguishing properties to be now noticed. In this vessel, which contains the blood to which the putrid animal fluid has been added, the crassamentum is throughout of a very dark colour, of uniform consistence, but soft, and readily broken down by the finger. I have not examined this specimen of blood with the microscope, but in others I have frequently been unable to detect any change. In some instances I have, however, noticed the diminution, and in one case (where the matter added to the blood was extremely putrid) the almost entire disappearance, of the coloured globules, the colouring matter being generally diffused. The colourless corpuscles appeared always unchanged. In the third vessel, which contains the blood to which the bile has been added, it will be seen that though only half an

ounce of bile was added, it has been sufficient to prevent any other than an almost diffluent crassamentum from being formed,—an effect probably due to the soda of the bile.

Such being the effects of pus and putrid fluids on the blood, the question arises,—What hypothesis will give the most natural explanation of the symptoms and morbid phenomena of the disease now commonly known by the name of Pyohæmia? M. D'Arcet has supposed that it is owing to the liquor puris becoming purulent after it has reached the lungs; but M. Sédillot has shown, that the serum produces no ill effects, when free from putrefaction; and that when putrid, though local diseases are induced, they are *not* of the nature of visceral abscesses, but of gangrene. M. Andral has referred this disease to a decomposition of the serum and the action of ammonia on the blood, rendering it dark and dissolved; but when the pus is *fresh*, it appears to me very difficult to understand how the animal matter can be converted into ammonia. And, further, the action of pus on blood is *not* to render it dark and dissolved, but, on the contrary, the crassamentum is firmer than natural. The changes, supposed by Andral to be owing to the entrance of pus into the circulation, are the result, as I have shown by repeated experiment, of the entrance of putrid matter into the blood. A careful perusal of the experiments of M. Gaspard will satisfy any one, that putrid matters exert their action principally on the mucous membrane of the intestines, giving rise to frequent, dark, and extremely offensive evacuations, usually attended with decided relief, and in some instances with entire disappearance of all the symptoms. The opinion of Rokitansky, that pyohæmia is to be referred to a spontaneous change in the blood, is quite untenable, as we have no evidence that the blood ever becomes diseased spontaneously. The opinion of Mr Lee, that pus imparts its own condition to the blood, is probably nearer to the truth; but, from a careful observation of the symptoms of the disease, from numerous experiments, and from the number of *post-mortem* examinations that I have attended, I have been irresistibly impressed with the belief, that the effects which follow the introduction of pus into the system are such as can be best understood by considering that it acts as a poison; and I think its resemblance to other animal poisons in its mode of action can scarcely fail to arrest attention. In many of them we have first a local disease (in the case of pyohæmia, this may be a stump after amputation, a diseased bone, that part of the uterus to which the placenta was attached, &c.), upon which secondary affections supervene in the form of violent inflammation in one or more parts of the body. In addition, there is a severe constitutional affection, which is characterised by a peculiar fever.

The opinion, that referred the secondary abscesses in the viscera to the mechanical arrest of the pus globules in the capillaries of those organs, was based upon the supposition, that the globules of pus were larger than the colourless corpuscles of the blood; but the best proof of the erroneousness of this opinion is to be found in the impossibility of distinguishing the pus globules from the colourless corpuscles of the blood. M. Sédillot has indeed stated that they might be distinguished; but the concurring testimony of all subsequent observers shows that he was mistaken. The experiments of Mr Gulliver appear to me to throw much light on the formation of these visceral abscesses. He found that the introduction of pus into the cellular tissue caused suppuration there more surely than foreign bodies of the most irritating kind; and he expresses the opinion, that it determines the nature of the subsequent exudation. I have witnessed nearly the whole texture of the liver destroyed by abscesses, the result of absorption of purulent matter from the interior of the colon; whilst the other organs of the body, after a careful scrutiny, were found free from all appearance of the same disease. *This, and numerous facts of a similar kind, show that the whole of the pus absorbed from the ulcerated intestine never passed beyond the capillaries of the liver, but was arrested there, not by any mechanical laws, but owing to alterations in the vital properties of the blood itself, which determined the nature of the subsequent inflammation;* and it is worthy of especial observation, that whilst idiopathic in-

flammation of the same organs ending in suppuration is attended with *hectic* fever, those resulting from animal poisons are attended by a fever which is essentially *typhoid;* and we have good reason to think that this peculiarity of the effect of inflammation depends on a deviation from the natural state of the vital properties of the blood.

In conclusion, I would remark that while the history, symptoms, morbid appearances, and analogies of the disease with other blood diseases, arising without doubt from animal poisons, tend to establish the fact, that purulent matter acts as a poison when received into the blood; yet we cannot conclude, as Mr Gulliver has done, that a small quantity of pus, whether in the blood or in a serous cavity, acts like a leaven, and speedily leads to the production of a great deal more; because it has been proved by repeated experiment that small quantities of pus may be injected into the blood without occasioning any ill effects. We must therefore conclude, that the poisonous action of pus on the blood is different from that of any other known poison; and that it requires, for the development of its poisonous action, that it should be introduced into the circulation in quantities sufficient to alter the natural state of the vital properties of the blood.

ON THE SYMPHYSIS PUBIS AND ITS CONTAINED CAVITY.

3. *Mr Zaglas* laid the following observations before the Society:—

The connection of the innominate bones at the symphysis pubis having uses which are intimately connected with the mechanism of support of the spine, I beg to call the attention of the Society to that part of the body,—for the few remarks which I am going to enter upon are in some measure supplementary of the general sketch already given of the relations between the pelvic bones, although they may not be entirely devoid of interest, when considered also independently of this circumstance. It is of the central cavity of the symphysis pubis that I have chiefly to speak; and I have to state the result of upwards of thirty observations, made for the purpose of ascertaining whether this cavity is, as commonly stated, an occasional or exceptional state depending in women on parturition and its consequences, or a state uniformly present in both sexes, and at all ages.

In the approximate number of subjects mentioned above, I have met with no exception to the presence of this cavity; upon which ground I may be justified in advancing, that it is a general and normal appearance for every age and for both sexes. It is true that, owing to the shortness of time since accident first induced me to pay attention to the subject, I have been able to make but a comparatively small number of observations, and I must add that, concerning the ages, the youngest subject that presented itself was a girl about ten years old. But then we must consider that, notwithstanding the want of instances in the earliest periods of life, and the smallness of the total number when subdivided into the separate amounts for every variety of sex and age, the constancy of the appearance throughout even these varieties, almost establishes the validity of the assertion.

On the present occasion I shall abstain from saying anything on the structure of the symphysis pubis, reserving this for another opportunity, when I may speak of it in connection with other subjects. And I shall at present say only a few words on the position and the extent of the pubic cavity. It is hardly deserving the name of a cavity, for it is but a slit between two opposed epiphysal cartilages of the pubic bones. It has, therefore, no transverse dimension, and extends through the symphysis pubis only lengthways and antero-posteriorly, measuring an inch or somewhat more in the former direction, and about four lines to half an inch in the latter. When the symphysis pubis is sawn across transversely, the slit is perceived on the posterior half of the surface of section; for from the pelvic cavity it is separated only by a thin layer of fibrous tissue, while anteriorly the layer of fibrous and fibro-cartilaginous tissue is very considerable. Often the slit extends still further towards the back, owing to a protrusion of the posterior

margins of the above-mentioned cartilages into the pelvic cavity, where they give rise to a more or less elevated ridge. This ridge, which sometimes is straight, sometimes serpentine, is then externally bridged over by the fibrous layer above-mentioned, and internally divided in two halves by means of the slit.

In the interior of the pubic symphysis, pus or other morbid deposits are found occasionally, contained in a cavity, chiefly after a fatal issue of labour. Such cavities are not to be confounded with the described one, although hardly a doubt can be entertained that the morbid deposits frequently occupy the same position. The parietes of the described cavity present no aspect of ulceration, nor anything like a morbid appearance, though occasionally a little detritus may be found contained in it, and consisting of patches (epithelium? layers of cartilage?) detached from the walls, which is easily accounted for by the constant attrition which they have to sustain, and is similar in character to the appearances met with in other articulations.

Remembering in what way the spine rests upon the innominate bones, the usefulness of such a construction in the symphysis pubis becomes apparent, although it would not seem to be one absolutely necessary, for a slight mobility of the two pubic bones, such as a connection by means of dense fibro-cartilaginous tissue would allow, appears sufficient for the purpose. When, for instance, the weight of the body is thrown forwards, and the base of the sacrum wedging itself betwixt the innominate bones, pushes them outwards, these latter bones are in the condition of two levers undergoing a great strain; the fulcra of these levers being the acetabula, the forces being applied opposite each side of the sacrum above, and at the points of contact of the two pubic bones below, where these bones are pressed against each other.

The symphysis pubis may, therefore, be considered as the common point of application of forces acting on two lateral levers (the ossa innominata); and it is clear that in so far as these levers admit of motion, that motion must be communicated to, and represented at, the symphysis, in the form of a change in the angle of the pubic bones towards each other. (The cartilaginous ridge of the symphysis, considered in the first cause of its protrusion, would imply that such a tendency towards motion, or even actual motion, takes place in a plane parallel to the superior outlet of the pelvis; but that this is neither the only nor the most important direction of the motion, I am satisfied, both from careful consideration of the complicated mechanism of the whole, and from numerous experiments and measurements, which I can but mention here, because entering into the necessary details would lead far off from my present purpose.) Here the usefulness, we may say the necessity, of a symphysis pubis impresses itself upon our consideration, and to render it more apparent, I may, in addition, allude to the consequences of a connection of the pubic bones, by means of a continuous osseous substance. There would be an osseous lamina, comparatively thin and long, stretched between the two acetabula, and receiving the whole weight of the body transmitted from them to its central point, in a direction very favourable for fracture. It should be considered, that the weight of the body may be here applied at a very great mechanical advantage, and so as to exceed very much its original amount of force, by means of the leverages which result from the different postures of the body. It is impossible to conceive how, under these circumstances, such a lamina could escape fracture, even in young persons. Moreover, I believe there is no instance where nature has trusted to the osseous substance for a resistance of the kind.

But there is no such imperious necessity for the existence of a pubic cavity or slit. The usefulness, however, cannot be denied, especially if the slight pubic motion be considered as assuming the direction which I have more specially alluded to. That it subserves an important purpose, however, is attested by the generality of its appearance, of which fact the following is a good illustration.

I here show to the Society a section of the symphysis pubis, from a young female, about eighteen years of age, and unmarried. On removing the symphysis pubis with a small portion of the pubic bones (which I did while the body

was quite recent, through the kindness of Dr Gairdner, and in his presence), our attention was directed to the fact, that the articulation appeared hardly moveable. Yet, even in this instance, you will observe that the slit or cavity above-described is perfectly developed.

MOVEMENT OF THE BRAIN.

4. *Dr Bennett* called the attention of the Society to the recent observations of Donders on the movements of the brain, produced by circulation and respiration in the fœtus, or in the opened skull of an adult animal. Professor Donders had clearly shown, by a most ingenious experiment on the living animal, the absence of all movements in the perfectly closed skull; a result which might, indeed, have been anticipated, and which was in perfect harmony with the observations made in Edinburgh, long ago, by Monro and Kellie, who considered the nervous substance and its fluids as completely filling up the cranium with incompressible substances, to which, therefore, no real general movements of the kind alluded to could possibly be communicated when the skull was entire. Dr Donders was also of opinion, that because during partial asphyxia he was enabled to see increased redness of the cerebral membranes, that therefore the quantity of blood in the brain was increased. But this opinion was in no way proved to be correct by the experiment, which only showed that *certain* vessels were congested, which congestion was probably counterbalanced by diminished capacity of other vessels, deeper seated. (See "Monthly Journal" for August 1851.)

Meeting VIII.—*July* 26, 1851.—Professor Bennett, P., in the Chair.

COMMUNICATIONS.

LEUCOCYTHEMIA.

1. *Dr Bennett* submitted to the observation of the Society the blood, and a portion of the spleen, of the man Tinlay, whose case had been previously narrated by Dr Bennett in the "Monthly Journal" as a well-marked example of leucocythemia; and who had lately died at Hull, under the care of Dr Sandwith, by whom the diseased parts had been transmitted to Edinburgh. The spleen was very greatly hypertrophied, and, like the blood, contained an immense proportion of white corpuscles, of the type usually found in such cases. The clots of blood in the heart presented a peculiar opaque granular appearance, as if mixed with pus; the microscopic structure of the fibrine also strongly resembled that observed in some inflammatory exudations, from the large number of corpuscles mixed with it. (This communication is minutely detailed in Dr Bennett's paper, in the "Monthly Journal" for October 1851.)

2. *Mr Drummond* communicated the details of another case of leucocythemia, which had occurred in the hospital. The case was one of complicated disease,—the liver being much atrophied and tuberculated, the kidneys affected with Bright's disease, and the spleen much enlarged, soft, and containing a mass of yellow friable deposit; the patient, a male, aged about 60, was very intemperate, and died of these diseases with ascites and anasarca. The excess of white corpuscles in the blood was well-marked, and the spleen contained a large number of similar corpuscles, as well as some more composite bodies, of large size (up to $\frac{1}{30}$th millimetre), and containing numerous internal nuclei. (This case is also detailed in Dr Bennett's paper, as above cited.)

3. *Dr W. T. Gairdner* took the opportunity of adverting to the existence of

a peculiar appearance in the blood of leucocythemia, and in very many other pathological structures (such as the pus of abscesses, &c.) In such cases there were often found very pale transparent vesicles, perfectly simple and homogeneous in structure, which sometimes occurred floating freely in the fluids, and sometimes were found to form an external envelope to pus corpuscles (in which latter connection they had been figured by Dr Bennett several years ago). Dr Gairdner exhibited many drawings, which he had at different times made of these bodies in all their relations, and entered at length into various speculations suggested by them as to the formation of the cell-wall in pathological and physiological structures. His views on the subject had been stated to the British Association of Science in 1850, but not published in detail; and he now observed, that much controversy had arisen in Germany in regard to these bodies, which had been independently observed by Bruch and others in a great variety of situations.

A lengthened debate followed in which Dr Bennett, Mr Goodsir, Dr Hannover of Copenhagen, and Dr Gairdner took part.

STRUCTURE OF THE VITREOUS HUMOUR.

4. *Dr Hannover* of Copenhagen laid before the Society various preparations illustrative of his published views of the structure of the vitreous humour of the eye in the different orders of the mammalia. The preparations were made by hardening the vitreous humour in chromic acid, which enabled its laminated structure to be seen distinctly on section.

Mr Cobbold said, he had examined the vitreous body after the manner pointed out by Dr Hannover. The great difficulty he had in regarding the striated appearance in the preparations on the table to be of a membranous character, arose from the fact, that when a single puncture was made through the hyaloid into the vitreous mass in its recent condition, after a few minutes, the fluid contents escaped, and all that we had left was its external tunic and a few septa or membranous prolongations of the hyaloid, constituting but a fiftieth part of the bulk of the vitreous body. It therefore appeared to him impossible that the stratified appearance could be of membranous origin, and he was strengthened in this conclusion by observing that in all instances where this character had been demonstrated, chromic acid or some other coagulating re-agent had been employed.

PUBLICATION.

The President, Vice-Presidents, and Secretaries were authorised to superintend the publication of the reports of the past summer Session.

In adjourning the Society till Saturday, November 15th, the President congratulated the members on the success which had attended their meetings. He trusted that during the vacation new facts and observations would be accumulated, which would render their future *réunions* as instructive and interesting as those which had just concluded.

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